Name:_____

Find the linearization of $f(x) = x^{\frac{1}{3}}$ at $x = 125$.

Given: $f(x) \approx f(a) + f'(a)(x - a)$

$\boxed{a = 125}$

$f(125) = 125^{\frac{1}{3}} = 5$

$f'(x) = \frac{1}{3}x^{-2/3}$

$f'(125) = \frac{1}{3} \cdot \sqrt[3]{125}^{-2}$

$= \frac{1}{3} \cdot \frac{1}{25}$

$= \frac{1}{75}$

$f(x) \approx f(125) + f'(125)(x - 125)$

$x^{\frac{1}{3}} \approx 5 + \frac{1}{75}(x - 125)$

Valid near $x = 125$